

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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In the Matter of)	
)	
Amendment of the Commission's Rules)	ET Docket No. 98-237
With Regard to the 3650-3700 MHz)	RM-9411
Government Transfer Band)	
)	
The 4.9 GHz Band Transferred from)	WT Docket No. 00-32
Federal Government Use)	

COMMENTS OF
ADAPTIVE BROADBAND CORPORATION

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Summary

Adaptive Broadband Corporation (“ADAP”) is a leading equipment supplier in the wireless broadband access market. Its key product, AB-Access™, is a point-to-multipoint last-mile system that employs time-division duplexing (“TDD”) technology to maximize bandwidth utilization and enable end users to both upload and download substantial amounts of data at rates up to 25 Mbps based on network demand. In these Comments, ADAP provides its views on the Commission’s proposed licensing and technical rules for the 3650-3700 MHz band.

Band pairing. ADAP supports the Commission’s proposal to license the 3650-3700 MHz band at the same time as the 4.9 GHz band in the same geographic areas. Since both bands are shared on a coprimary basis with other services, thereby creating coverage gaps, the simultaneous licensing of the 3650-3700 MHz and 4.9 GHz bands would enable licensees to pick and choose between the bands in each region to ensure complete coverage. However, the Commission should not “pair” these bands in the traditional sense, *i.e.*, the Commission should not subject these frequency bands to the same technical and licensing rules and force bidders at auction to accept both frequency blocks in a particular geographic region. ADAP believes that no equipment is available today that is capable of duplex operation in the 3650-3700 MHz and 4.9 GHz bands and that none is likely to be available in the future in light of the substantial cost associated with such equipment.

Band segmentation. ADAP recommends that the Commission license the 3650-3700 MHz band in two 25 MHz blocks. Use of 25 MHz blocks would be consistent with the band plans used in other countries for the 3400-3700 MHz bands and would give licensees many options in terms of the types and numbers of signals employed.

Base station power limits and antenna height restrictions. An operating limit of 1640 Watts peak EIRP is similar to the operating limits adopted by Canada and is acceptable. Because of antenna size constraints, most systems will operate well below the maximum EIRP limit. ADAP believes that height restrictions are not necessary under these circumstances and notes that Canada has not adopted such restrictions.

Out of band emission limits. The emission limits set forth in Section 101.111 of the Commission's Rules are not appropriate for use with the 3650-3700 MHz band. ADAP recommends that the Commission adopt a slightly amended version of Nortel's alternative emission limits. This alternative does not suffer from the same deficiencies as the emission limits in Section 101.111.

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**COMMENTS OF
ADAPTIVE BROADBAND CORPORATION**

I. Introduction.

Adaptive Broadband Corporation (“ADAP”), by its attorneys and pursuant to Section 1.429 of the Commission’s Rules, 47 C.F.R. §1.429, hereby submits these Comments in response to the Commission’s Notice of Proposed Rulemaking in the above-captioned proceeding.¹ In this proceeding, the Commission is proposing to establish licensing and operating rules for the 3650-3700 MHz band. In addition, the Commission seeks comment on the feasibility of pairing this band with the 4940-4990 MHz band (the “4.9 GHz band”).

ADAP’s views on the Commission’s proposals regarding band pairing, band segmentation, base station power limits and antenna height restrictions, and out of band emission limits are set forth below.

¹ FCC 00-363, rel. Oct. 24, 2000 (“Notice”).

II. ADAP and Its Interest In This Proceeding.

ADAP is a pioneer and a leading equipment supplier in the wireless broadband access market. The company's last-mile terrestrial wireless systems support ultra-high speed Internet access from service providers (including ISPs, competitive local exchange carriers, and interexchange carriers) to data communication end users such as corporate, business, and residential customers. Founded in 1968 as California Microwave, ADAP in recent years has sharpened its market and product focus to concentrate solely on wireless broadband solutions such as ADAP's AB-AccessTM point-to-multipoint system ("AB-Access").

AB-Access is a wireless Internet access solution that enables end users to both upload and download substantial amounts of data at rates up to 25 Mbps based upon network demand. Users employing AB-Access can transmit voice, download full-streaming video, download data files, use real-time video conferencing, and surf the Web all at the same time over a single connection. The AB-Access product employs time-division duplexing ("TDD") to maximize bandwidth utilization. As a general matter, TDD has many advantages over frequency-division duplexing ("FDD"). For example, TDD is much more flexible in terms of spectrum planning, as it does not require a paired frequency allocation. CPE equipment cost is lower with TDD, as TDD requires less equipment, and spatial diversity can be implemented and channel equalization performed at the base station only. With TDD technology, simpler and more effective adaptive antennas can be used. Finally, with TDD, adaptive channel equalization – combined with transmitter side pre-distort – can improve resistance to multipath performance impairments.

AB-Access builds upon conventional TDD, as ADAP has added dynamic capabilities to this technology. The pre-selected measured intervals of alternating upstream-downstream traffic that are a hallmark of conventional TDD have been replaced with a dynamic customer-

responsive mechanism which permits the radio to change between transmit and receive modes in two (2) microseconds. The result is a technology which maximizes the efficient use of available spectrum while providing end-users with bandwidth that is instantly responsive to their ever-changing needs.

AB-Access can support a wide range of available spectrum, up to 42 GHz. AB-Access is already being used commercially in the 5 GHz U-NII band, with service providers in California, Idaho, Texas, New York, and Florida using it in the “last mile” to deliver high-speed Internet access to business and residential subscribers. In addition, ADAP has introduced the product for use in the 2.5 GHz ITFS/MMDS band and in the 3.5 GHz band in Europe. ADAP is interested in deploying AB-Access in other bands, and thus has a direct and vital interest in this proceeding.

III. Comments On Licensing and Technical Rules For The 3650-3700 MHz Band.

ADAP applauds the Commission’s decision to allocate the 50 MHz of spectrum in the 3650-3700 MHz band to the fixed and mobile terrestrial services on a primary basis. The FCC's planned licensing of this band is likely to play an important role in increasing the availability of wireless access to high speed Internet connectivity for small businesses and consumers.

Although relatively narrow, the 3650-3700 MHz band is sufficiently wide to provide high speed access to a large number of users, even in urban environments, using modern TDD technologies such as employed in AB-Access. In rural areas, the propagation characteristics of the 3650-3700 MHz band are sufficiently favorable to enable the provision of service to previously unserved rural customers, provided that the technical rules permit adequate effective radiated power levels to be employed. Thus, the allocation and assignment of the 3650-3700 MHz band for high speed access services will promote the objectives of Section 706 of the Telecommunications Act of

1996 to facilitate the rapid deployment of advanced telecommunications services and technologies to all Americans, and will thereby serve the public interest.

ADAP's comments on the Commission's proposals for licensing and technical rules applicable to the 3650-3700 MHz band are set forth below.

A. The Commission Should License The 3650-3700 MHz Band At The Same Time As The 4.9 GHz Band In The Same Geographic Areas, But The Commission Should Not "Pair" the Bands In The Traditional Sense.

In the Notice, the Commission observes that it has separately proposed to allocate 50 MHz of spectrum in the 4.9 GHz band for fixed and mobile broadband services, and asks whether the 4.9 GHz band should be paired with the 3650-3700 MHz band in some fashion.² ADAP's views on the Commission's proposal depend upon what is meant by "pairing."

Traditionally, "pairing" has meant that two frequency bands which are separated by 50, 100, or some other amount of MHz are made subject to the same technical, application, licensing, and processing rules. The bands are joined for licensing purposes such that a prospective licensee that bids at auction on one frequency band in a particular geographic area must bid on and accept the other band as well. To the extent that the Commission proposes to "pair" the 3650-3700 MHz band and the 4.9 GHz band in this fashion, ADAP objects, as there are few if any benefits to be derived from such pairing. To ADAP's knowledge, there is no equipment available today which is capable of duplex operation in the 3650-3700 MHz and 4.9 GHz bands. More importantly, ADAP believes it is unlikely that such equipment would ever be developed and sold at a reasonable cost. Frequency division duplex operation over such a large separation (1240 MHz) is not the norm for terrestrial services. Developing equipment that could

² Notice at ¶¶ 43-44.

operate in both frequency bands would be extremely expensive, as the economies of circuitry offered with the common 50 or 100 MHz duplex splits are not present with a greater than 1000 MHz split. Whole portions of frequency-generating circuitry would have to be duplicated to operate in each range, resulting in considerable additional product cost. The fact that this band combination would be unique to the U.S. would mean that the economies of scale offered by worldwide sales could never be realized. There are also operational considerations regarding propagation differences with such a wide split that would discourage development of dual band equipment.

However, if by “pairing” the Commission is proposing simply to make both frequency bands available at the same time in the same geographic areas, then ADAP supports the Commission’s proposal. Under this scenario, the 3650-3700 MHz and 4.9 GHz bands would not be subject to identical technical rules, nor would licensees be required to bid on both bands in the same geographic region at auction. There are definitive advantages to “pairing” the 3650-3700 MHz band and 4.9 GHz bands in this fashion. Taken separately, each band is well suited to providing fixed wireless access using TDD systems. Yet because each band must be shared on a coprimary basis with another service, there will be locations in which one of the bands will be effectively unavailable for use. If the bands are licensed simultaneously for the same geographic regions, then licensees will be able to pick and choose between the bands in each region to ensure complete coverage.

ADAP notes that if the Commission does not attempt to subject the 3650-3700 MHz and 4.9 GHz bands to the same technical rules, both bands are likely to attract the attention of equipment manufacturers. As ADAP explained in its Reply Comments filed in the 4.9 GHz

proceeding,³ equipment could be made readily available for the 4.9 GHz band, if the technical rules for the 5 GHz U-NII band form the basis for the technical rules applicable to the 4.9 GHz band, but with higher available EIRP levels to reflect the licensed status of the 4.9 GHz band. The proximity of the 4.9 GHz band to the unlicensed 5 GHz U-NII band would make the modification of U-NII band products for operation at 4940-4990 MHz a relatively straightforward product development. Similarly, equipment for use in the 3650-3700 MHz band can easily be based on products which were developed for the 3400-3600 MHz band and are being deployed today in Europe and in other countries around the world. Thus, if the Commission does not attempt to “pair” the 3650-3700 MHz band and 4.9 GHz bands in the traditional fashion but simply makes both bands available at the same time in the same geographic regions, equipment suitable for use in these bands should be readily available to licensees. The ready availability of product for these bands should stimulate the interest of prospective carriers in obtaining licenses and should ensure the rapid deployment of systems in the field.

B. The 3650-3700 MHz Band Should Be Licensed In Two 25 MHz Blocks.

In the Notice, the Commission seeks comment on the size of spectrum block or blocks that should be used to license the 3650-3700 MHz band.⁴ ADAP recommends that the Commission license the 3650-3700 MHz band in two 25 MHz blocks. Such band segmentation would be consistent with the band plans used elsewhere for the 3400-3700 MHz band, *e.g.*, the Canadian band plan for 3400-3700 MHz Fixed Wireless Access Systems, which employs 25

³ See Reply Comments of Adaptive Broadband Corp. filed May 17, 2000 in *In Re The 4.9 GHz Band Transferred From Federal Government Use*, WT Docket No. 00-32

⁴ Notice at ¶ 70.

MHz blocks. ADAP notes that Canada does not restrict the licensees' use of these blocks in terms of modulation or occupied bandwidth.

Use of 25 MHz blocks for the 3650-3700 MHz band also has the advantage of giving licensees considerable flexibility in terms of the types and numbers of signals employed. ADAP can envision a 25 MHz block being used by a licensee in any one of a number of ways, *e.g.*, for four 6 MHz MMDS-like signals. Similarly, a 25 MHz block could carry five 5 MHz signals for a cellular-type FWA system, which would provide considerable flexibility in cell planning while still achieving very high data transfer rates. Even some of the European channel bandwidths fit reasonably well into a 25 MHz block, *e.g.*, fourteen 1.75 MHz channels or seven 3.5 MHz channels. ADAP believes that use of blocks that are narrower than 25 MHz will make each block less usable while limiting the technology that can be employed in the band. Such limitations and restrictions could easily discourage prospective licensees from bidding for the band. As such, the public interest would be better served if the Commission were to license the 3650-3700 MHz band in two 25 MHz blocks.

C. A Base Station Power Limit Of 1640 Watts EIRP Is Acceptable, But Antenna Height Restrictions Are Unnecessary.

In the Notice, the Commission seeks comment on what, if any power limits and antenna height restrictions are necessary or appropriate for the 3650-3700 MHz band under either a coordination or field strength limit approach. In particular, the Commission is considering adopting operating limits similar to those now employed for broadband PCS, *i.e.*, a base station height/power limit of 1640 Watts peak effective isotropic radiated power ("EIRP") with an antenna height up to 300 meters.⁵ This limit is similar to the operating limit adopted by Canada

⁵ Notice at ¶ 101.

in SRSP-303.4 Issue 1, which is 32 dBW (1585 Watts). ADAP notes that Canada has not placed a height restriction in its rule. Since the Commission is also considering a maximum field strength limit at licensed area boundaries, it is not clear why a height restriction would be necessary under these circumstances.

As previously noted, ADAP believes that equipment developed for fixed wireless access and similar applications in the 3650-3700 MHz band will be based on designs for use in identical applications in the European 3400-3600 MHz band. Equipment designed for the European band must comply with certain ETSI standards, specifically ETSI EN 301 021 V1.3.1 (2000-10) for the radio and ETSI EN 302 085 V1.1.1 (2000-06) for the point-to-multipoint antenna. These standards restrict the transmitter power output to 35 dBm (3.16 Watts) and place minimum, but not maximum, gain restrictions on the antennas. It would take an antenna gain of more than 27 dBi with 3.16 Watt transmitter power output to reach the proposed 1640 Watt EIRP limit. Because of antenna size constraints in fixed wireless access equipment, it is likely that systems designed to meet both European and FCC technical requirements would actually be operating at well below the 1640 Watt EIRP limit. ADAP does not recommend a lower limit, however, because there may be situations, particularly in rural service areas, where it will be necessary or desirable to operate at the full permitted radiated power.

D. The Commission Should Adopt An Amended Version of Nortel's Proposal For Out of Band Emissions Limits.

To provide interference protection for operations in adjacent frequency bands, the Commission in the Notice proposes to require that terrestrial service equipment operating in the 3650-3700 MHz band comply with the emission limits already in place for fixed service

operation in the 3700-4200 MHz band.⁶ These limits are set forth in Section 101.111 of the Commission's Rules. In reaching its tentative conclusion regarding out of band emission limits for the 3650-3700 MHz band, the Commission rejects alternative emission limits proposed by Nortel on the grounds that the emission limits set forth in 101.111 are "more flexible."⁷ Nortel recommends that at the edge of the 50 MHz block in any 30 kHz bandwidth, unwanted emission spectral power density be attenuated by at least (i) 10 dB at the band edge; (ii) 25 dB at 200-400 kHz from the band edge; (iii) 25dB at 400 kHz to 50 dB at 3.0 MHz offset, linearly interpolated; and (iv) 50 dB beyond 3 MHz from the band edge or in any one MHz band which is removed more than 250% of the necessary bandwidth at least $43 + 10 \log (P_{\text{mean}})$ dB, or 80 dB whichever is less stringent, where P_{mean} is the mean output power of the transmitter in Watts.⁸

ADAP urges the Commission to reject its tentative conclusion and adopt the emission limits proposed by Nortel, except that the limit at more than 250% of necessary bandwidth should be at least $43 + 10 \log (P_{\text{mean}})$ dB or 70 dB, whichever is less stringent. In ADAP's experience, the emission limits set forth in Section 101.111 are obscure, complicated, and outdated. More importantly, the emission limits in Section 101.111 are simply inappropriate for use in these circumstances. For example, while Section 101.111(a)(2)(i) specifies use of a 4 kHz measurement bandwidth, no measuring equipment is available with a 4 kHz bandwidth.⁹

Similarly, ADAP notes that Section 101.111 defines the emission mask in terms of the

⁶ Notice at ¶ 111.

⁷ Notice at ¶ 111.

⁸ Notice at ¶ 110.

⁹ As the Commission can confirm, spectrum analyzers, which are typically used for these measurements, generally have a 1,3,10 sequence of measurement bandwidths, meaning that measurements for purposes of determining compliance with the requirements of Section 101.111 are made at 3 kHz, 10 kHz, or 30 kHz, and then mathematically corrected to equivalence with the 4 kHz bandwidth in Section 101.111.

authorized bandwidth. While this may be suitable for single channel bands, it is not appropriate for the present situation where a licensed frequency block can be split into multiple channels that are all used by the same licensee, and where only interference into adjacent blocks and beyond is regulated. Nortel's formulation does not suffer from these deficiencies. Furthermore, ADAP notes that Nortel's proposed emission limits have been adopted by Industry Canada (with the change recommended above by ADAP) in its rules for Fixed Wireless Access Services in the 3400-3700 MHz band.¹⁰ In light of these facts, ADAP recommends that the Commission adopt Nortel's proposed emission limits.

¹⁰ See SRSP-303.4 Issue 1 at ¶ 5.2, "Out-of-Block Emission Limits."

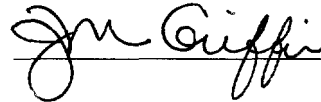
IV. Conclusion.

In light of these facts, the FCC should adopt licensing and technical rules for the 3650-3700 MHz band as proposed herein.

Respectfully submitted,

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